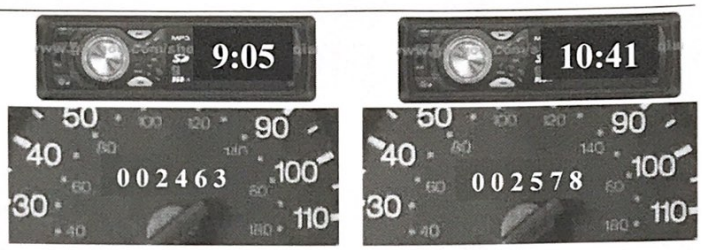
SPH3U: Measurement and Numbers Homework **Name:** Solin

A: The Physics Road Trip

You decide to take a trip to hear a lecture by one of your favourite physicists. When you begin driving, you glance at the clock in your car and also look at the odometer. As you pull in to the physics department parking lot, you look at the clock and the odometer a second time.



1. How much time did the trip take in **minutes**? 1 hr + 36 min
   = 96 min

2. We would like to change this time interval into **seconds**. Explain how to do this conversion and then show the math.
   $96\ \text{min}\left(\frac{60\ \text{sec}}{1\ \text{min}}\right) = 5760\ \text{sec}$

3. Think carefully about your result in seconds - how many of the digits do you think are reliable or significant? Remember that the measurement device only measures to the nearest minute. Rewrite your answer if necessary.
   2 sig. fig 5760 → 5800 sec

4. What distance, in kilometers, did you travel? 2578 - 2463 = 115 km

5. We would like to change this distance into metres. Explain how to do this conversion, then show the math.
   $115\ \text{km}\left(\frac{1000\ \text{m}}{1\ \text{km}}\right) = 115\,000\ \text{m}$

6. Think carefully about your distance in metres – explain how many significant figures your result should have. Rewrite your answer if necessary.
   3 sig. fig 1.15×10^5 m

7. Calculate your average speed (average speed = distance traveled / time interval) during this trip twice – first, to get an answer in kilometers per hour and second, to get an answer in metres per second.

kilometers per hour	**metres per second**
96 min → 1.6 hr $\frac{115\ \text{km}}{1.6\ \text{hr}} = 72\ \frac{\text{km}}{\text{hr}}$	$\frac{115000\ \text{m}}{5800\ \text{s}} = 19.83\ \text{m/s}$ $\doteq 20\ \text{m/s}$

General Guideline for Significant Figures: When performing calculations, write the intermediate results with one extra significant figure and the final answer with no more significant figures than the piece of data with the least. This is a handy but very approximate rule of thumb. In university you will learn a mathematical system for determining the error in your calculated results which will replace this handy rule.

8. Explain how many significant figures each final answer should have.